

1.

Apparatus for applying powder to at least an interior surface of a hollow object, the apparatus comprising:

a powder discharge device adapted to receive powder and discharge the powder through an outlet;

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an object holder configured to hold said object such that said outlet is positioned within the hollow object adjacent the interior surface;

and

a rotating mechanism configured to engage and rotate the hollow object such that powder discharging from the outlet coats the

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interior surface as the interior surface rotates past the outlet.

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2. The apparatus of claim 1, wherein said powder discharge device further comprises a chamber, and said outlet is positioned in an upper portion of said chamber, said chamber adapted to receive and fluidize a bed of the powder to form a powder cloud discharging through said outlet.

3. The apparatus of claim 2, further comprising:
a porous member positioned at a lower portion of said chamber below the bed of powder and having an upper side facing the bed of powder and an opposite lower side;

an electrostatic charging device positioned in an air flow path leading to said lower side of said porous member; and

a pressurized air inlet for directing pressurized air into said air flow path such that the air is charged by said electrostatic charging device and then passes respectively through the lower and upper sides of said porous member and into the bed of powder.

4. The apparatus of claim 1, wherein the hollow object includes an exterior surface and said object holder further comprises a pair of rollers configured to engage generally opposite sides of the exterior surface, and said rotating mechanism further comprises a motor coupled to at least one of said rollers.

5. The apparatus of claim 1, wherein the hollow object includes an axis of rotation and said outlet further comprises an elongate slot configured to extend parallel to the axis of rotation.

6. The apparatus of claim 5, wherein said powder discharge device includes a chamber and said elongate slot is formed between converging walls of said chamber.

7. The apparatus of claim 1, further comprising:
a transfer mechanism coupled to said powder discharge device and operative to transfer said powder discharge device from a position outside the hollow object to a position within the hollow object.

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8. Apparatus for applying powder to at least an interior surface of a hollow object, the apparatus comprising:

a chamber having an upper portion, a lower portion and a converging area gradually decreasing in dimension in a direction from said lower portion toward said upper portion;

a powder fluidizing bed disposed at said lower portion of said chamber and adapted to receive and fluidize a bed of the powder to form a powder cloud emanating upwardly from said lower portion, through said converging area to said upper portion of said chamber;

an outlet positioned at said upper portion of said chamber and configured to direct at least one stream of said powder from said powder cloud out of said chamber;

a powder collection unit positioned to collect excess powder which has not been applied to the object;

an object holder configured to hold the object such that said outlet is positioned within the hollow object adjacent the interior surface; and

a rotating mechanism configured to engage and rotate the hollow object such that powder discharging from the outlet coats the interior surface as the interior surface rotates past the outlet.

9. The apparatus of claim 8, further comprising:
a porous member disposed at said lower portion of said chamber below the bed of powder and having an upper side facing the bed of powder and an opposite lower side;

5 an electrostatic charging device positioned in an air flow path leading to said lower side of said porous member; and

a pressurized air inlet for directing pressurized air into said air flow path such that the air is charged by said electrostatic charging device and then passes respectively through the lower and upper sides of said porous member and into the bed of powder.

10. The apparatus of claim 8, wherein the hollow object includes an exterior surface and said object holder further comprises a pair of rollers configured to engage generally opposite sides of the exterior surface, and said rotating mechanism further comprises a motor coupled to at least one of said rollers.

11. The apparatus of claim 8, wherein the hollow object includes an axis of rotation and said outlet further comprises an elongate slot configured to extend parallel to the axis of rotation.

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The apparatus of claim 8, further comprising:

a transfer mechanism coupled to said chamber and operative to transfer said chamber from a position outside the hollow object to a position within the hollow object.

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13. Apparatus for applying powder to at least an interior surface of a hollow object, the apparatus comprising:

a first chamber having an upper portion, a lower portion and an outlet in said upper portion;

5 a powder fluidizing bed disposed at said lower portion of said first chamber and adapted to receive and fluidize a bed of the powder to form a powder cloud emanating upwardly from said lower portion to said upper portion and through said outlet;

10 an object holder configured to hold the object such that said outlet is positioned within the hollow object adjacent the interior surface; and

a powder collection area positioned outside said first chamber; a rotating mechanism configured to engage and rotate the hollow object such that powder discharging from the outlet coats the interior surface as the interior surface rotates past the outlet; and

15 a powder collection unit connected in fluid communication with said powder collection area for collecting excess powder which has not been applied to the object.

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14. The apparatus of claim 13, further comprising a second chamber positioned below said first chamber, wherein the hollow object includes an exterior surface and said object holder further comprises a pair of rollers mounted within said second chamber and configured to engage generally opposite sides of the exterior surface, and said rotating mechanism further comprises a motor coupled to at least one of said rollers.

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15. The apparatus of claim 14, further comprising:
respective powder removing devices within said second
chamber and operating to remove powder from said rollers for subsequent
collection by said powder collection unit.

16. The apparatus of claim 13, further comprising:
a transfer mechanism coupled to said first chamber and
operative to transfer said chamber from a position outside the hollow object
to a position within the hollow object.

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17.

A method of applying electrostatically charged powder to an interior surface of a hollow object, comprising:

positioning a powder discharge device having a powder discharge outlet within the hollow object;

5 directing a stream of the electrostatically charged powder through the powder discharge outlet; and

rotating the object with the interior surface positioned adjacent the opening and in contact with the stream of electrostatically charged powder.

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18. The method of claim 17, wherein said powder discharge device further comprises a chamber having said powder discharge outlet, the method further comprising:

forming a cloud of the electrostatically charged powder within
5 the chamber; and
moving the cloud within the chamber generally toward the powder discharge outlet.

19. The method of claim 18, wherein moving the cloud further comprises introducing electrostatically charged, pressurized air through a bed of the powder in fluid communication with the chamber.

20. The method of claim 17, wherein the object is a motor stator having internal slots and the method further comprises directing the stream into the internal slots.

21. The method of claim 20, wherein the motor stator includes opposite end faces and a length dimension extending between the end faces, and the powder discharge outlet is longer than the length dimension, the method further comprising:

5 coating the end faces with powder from the stream of electrostatically charged powder.

22. The method of claim 18, wherein the step of positioning the powder discharge device further comprises:
moving the chamber into the hollow object.

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